

Serial No.: 10/730,436
Office Action Date: 10/05/2004

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REMARKS/ARGUMENTS

The Office Action dated 10/5/2003 rejected claims 1-4 and 6-10 under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 5,918,577 to Martelli et al. (hereafter *Martelli*) in view of United States Patent No. 4,700,684 to Pischinger et al. (hereafter *Pischinger*). Claim 5 was objected to as being dependent upon a rejected base claim, but was indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. More particularly, the Office Action alleges that Martelli discloses the claimed invention except for the engine being a diesel engine with the closing timing of the exhaust valve and the retarded opening of the intake valve. The Office Action further alleges that Pischinger teaches it is known to provide the exhaust valve closing in advance of a retarded opening of the intake valve. The Office Action concludes that it would have been obvious to modify the valve timing of Martelli by providing an exhaust valve closing in advance of a retarded opening of the intake valve as taught by Pischinger. The Office Action further considers it an obvious design choice to provide the engine of Martelli be a diesel engine alleging that Applicants have not disclosed that the variable valve timing [of Applicants' invention] could only be used on a diesel engine and that the variable valve timing of Martelli would perform equally well on a diesel engine.

Applicants gratefully acknowledge the Office Action's allowability of claim 5. Applicants, however, respectfully traverse the rejection of all claims 1-4 and 6-10 as further described herein below.

Martelli discloses a throttled (FIG. 1, (28)) internal combustion engine with port injection (FIG. 1). Martelli discloses use of a single cam phaser with a single overhead camshaft to actuate both intake and exhaust valves. Martelli also discloses the alternative use of two camshaft phasers with dual overhead camshafts to actuate both intake and exhaust valves. (col. 3, ll. 44-51). Martelli discloses these camshaft phasers are used to control induction of exhaust gases from the exhaust port during the intake stroke of the engine. Martelli also discloses the use of specialized exhaust port designs or motion control valves to control motion of exhaust gas inducted into the combustion

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chamber (col. 4, ll. 8-24). It is specifically the motion control of the exhaust gases ingested into the combustion chamber through the exhaust port that is central to the teaching of Martelli.

One skilled in the art understands Martelli teaches away from a diesel engine application in as much as a single cam phaser and single camshaft controlling both intake and exhaust valves is not an operable configuration due to piston head to valve clearance limitations in a diesel engine (Para. 0022). And the induction of exhaust gases through the exhaust port requires retarded closing of the exhaust valve which as specifically discussed in Applicants' specification is not compatible with a diesel engine. One skilled in the art further understands Martelli teaches away from a diesel engine application in as much as the throttle and port injection are not compatible with a diesel engine. The Office Action's conclusion that it is an obvious design choice to provide the engine of Martelli be a diesel engine is simply not supported in view of the Martelli teachings, their incompatibility with diesel engines and the Applicants' specification and claims.

In contradistinction, Applicants' present invention specifically recognizes the characteristics of diesel engines which heretofore have supported avoidance of cam phaser introduction on diesel engines. The present invention allows for only advances of the exhaust valve timing which traps exhaust gases within the combustion chamber. This, of course, is the opposite exhaust valve timing direction taught by Martelli and does not result in reinducted exhaust gases and therefore cannot effect the objective exhaust gas motion within the combustion chamber as taught by Martelli. Applicants' invention is simply not concerned with motion control of reinducted exhaust gases and, in fact, does not claim and is not compatible with any induction of exhaust gases through cam phaser controls which allow for retarded exhaust valve timing as taught by Martelli.

Pischinger also appears to disclose conventional throttled engine applications but adaptation thereof through valve timing controls designed to progressively reduce the cylinder volume available for air and fuel by occupying the volume with exhaust gases as load decreases. In this manner, engine load is controlled. (col. 1, l. 28 – col. 2, l. 28).

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One skilled in the art understands that Pischinger teaches fully flexible valve controls for each of the intake and exhaust valves. That is to say, both closing and opening times of each valve are independently controllable in advances and retards thereof (col. 3, ll. 10-15; col. 3, ll. 41-44). The various FIGS. 5-10 and corresponding description illustrate various valve timings and, significantly, timings which are problematic and incompatible with exhaust and intake valve timings in a diesel engine and/or teach away from (e.g. exhaust gas induction) the recompression of Applicants' invention (e.g. intake valve advances, exhaust valve retarding).

In contradistinction, Applicants' present invention specifically recognizes that such fully flexible valve controls are not compatible with diesel engines due to the cylinder head to valve clearances. Applicants' invention is not concerned with progressive reduction of cylinder volume for air/fuel charge as engine load decreases with complicated fully flexible valve controls. Rather, Applicants' invention is concerned with increases in in-cylinder temperature effected by the recompression of trapped exhaust gas residuals by simple one-sided (advancing) exhaust valve cam phasers at various specific engine operating conditions. (e.g. para 5). Applicants' invention does not claim and is not compatible with the fully flexible valve controls as taught by Pischinger.

Any combination of Martelli and Pischinger fails to produce the claimed invention. Importantly, the application of the valve control strategies or hardware disclosed in either of Martelli or Pischinger to the diesel engine of Applicants' invention would render an inoperative device.

The Martelli and Pischinger, individually or in proposed combination, fail to teach or suggest the present invention of claims 1-10. The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); *ACS Hospital Systems, Inc. v.*

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Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that "[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." **In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976).** See also **In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984)** ("In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.") Objectives of the prior art references are a strong indicator of what the reference teaches. **WMS Gaming Inc. v. International Game Tech., 184 F.3d 1339, 15 USPQ2d 1385 (Fed Cir. 1999).** References which teach away cannot serve to create a prima facie case of obviousness. Combined references which produce an inoperative device teach away from the combination. **In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir 1984), see also Tec Air, Inc. v. Denso Mfg. Mich. Inc., 192 F.3d 1353, 52 USPQ2d 1294 (Fed. Cir. 1999).** Clearly, neither Martelli nor Pischinger teaches valve controls compatible with diesel engines or even suggests their applicability to diesel engine controls. Particularly, they fail to teach or suggest, alone or in combination, the specific and simple one-sided exhaust valve cam phaser control of Applicants' present invention. The proposed references are simply not effectively combinable to arrive at or suggest the presently claimed invention.

It is also well settled that the initial burden is on the Patent Office to provide some suggestion of the desirability of doing what the inventor has done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). No such expressed or implied suggestion is afforded by Martelli or Pischinger and no line of reasoning as to

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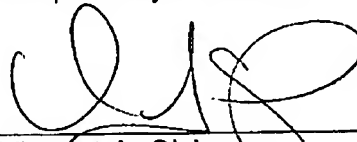
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why the artisan would have found the claimed invention to have been obvious in light of the teachings has been provided.

Applicants respectfully request that the rejections of claims 1-10 under 35 USC 103(a) be withdrawn for the reasons set forth above. It is respectfully submitted that all claims are in a condition for allowance, which allowance is solicited.

If the Examiner has any questions regarding the contents of the present response he may contact Applicants' attorney at the phone number appearing below.

Respectfully submitted,



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